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ABSTRACT

Noting that the educational sector in Britain has been a small but influential user of videotex systems since the launch of the public Prestel service in 1979, this paper surveys the main trial uses in education. The studies reviewed begin with a 1-year trial of Prestel in 1980-81, which identified two applications as having further potential: as a source of information on careers and to provide an overview of current resources on a given subject. A 2-year trial of the distribution of microcomputer software via telephone lines that began in September 1981 is briefly described, as well as several other educational initiatives on Prestel; private videotex systems in education; and the development of a private videotex system, Optel, at the Open Univeristy. Other Open University projects described include the ECCTIS scheme, a computerized Educational Counselling and Credit Transfer Information Service; the ECCTIS videotex system; and the Cyclops telewriting project. A description of the new and more powerful version of Cyclops called Excom 100 and its applications in various areas includes the Indonesian pilot trial linking 12 university campuses in that country. An outline of additional potential applications of videotex in education, a discussion of reasons why videotex is not a suitable medium for computer assisted learning, cautions about telesoftware systems, and some speculations as to the next steps in Britain conclude this paper. Four references are listed. (DJR)

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THE OPEN UNIVERSITY

Faculty of Technology

Optel Report No 15

VIDEOTEX IN EDUCATION
THE BRITISH SITUATION

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TO THE EDUCATIONAL RESOURCES

VIDEOTEX IN EDUCATION
THE BRITISH SITUATION

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Abstract

The educational sector in Britain has been a small but influential user of videotex systems since the launch of Prestel in 1979. This paper surveys the main trial uses in education, covering not only public videotex but also private videotex and specialised videotex terminals.

Note

This paper is based on a talk given at "Videotexto 84" held at Sao Paulo, Brazil in September 1984.

Optel Report Series

The "Optel Reports" are a series of occasional papers on videotex developments in the Open University. For further information contact:

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1. Introduction

Even prior to the launch of the public Prestel service in September 1979, there was educational interest in the medium, since both the Open University and the Council for Educational Technology (CET) were Information Providers on the Prestel pilot system. The CET have remained ever since as an Information Provider (supporting now about 50 other organisations on an 'umbrella' basis). The Open University's focus of interest soon moved to private videotex systems, but it has recently begun significant activity on Prestel again.

2. Early educational use on Prestel

Like several other parts of the Prestel database, it has taken some time to get the product mix right for a Prestel Education service.

In the early years of UK videotex the assumption was made by educationists (as by everyone else) that the main outlet for videotex would be a mass domestic market. Consequently the CET established their umbrella Information Provider service, supplying a variety of material from individual educational bodies such as the Open University. However the emphasis soon began to turn towards videotex as a source of information for teachers (rather than directly to students).

In 1980-81 the CET carried out a one-year trial of Prestel in 32 educational institutions. The trial was fairly successful; two topics that were identified as having further potential were for careers information, and to provide an overview of current resources in a subject. The usual criticisms were made of weaknesses in indexing, and incompleteness of information.

3. Telesoftware on Prestel

In 1981, interest was building up in telesoftware, namely the distribution of microcomputer software via telephone lines. In particular, the Chiltern Region Advisory Unit at Hatfield had been doing so already, but using a non-viewdata method. In July 1981 an 'interim' protocol was agreed by interested parties, and published by CET. (Needless to say, the interim protocol is still being used with only minor modifications on major services such as Prestel Micronet.)

A two-year trial of telesoftware, run by the CET, started in September 1981. Although there were numerous technical problems in perfecting the microcomputer decoders for telesoftware, interest grew rapidly in educational and commercial circles, and this resulted in the launch of Prestel Micronet in 1982.

Although Prestel Micronet has succeeded very well with home microcomputer users, there are some technical questions which must be addressed when one considers the business and educational sectors: I shall return to these at the end of the paper.

4. Other educational initiatives on Prestel

Club 403 is a trial Prestel service for residential users in the Birmingham area. Early market research there showed a surprisingly high interest in education, and so a small education database was installed as part of the trial.

Some educational commentators such as myself are sceptical of surveys showing high interest in education, since such levels of interest have not been confirmed by subsequent takeup of education services. Part of the reason seems to be that, at least to a British audience, the word 'education' has a very wide meaning,

far wider than the products currently supplied by the formal education sector.

A service taking advantage of one such wider meaning, namely the desire of parents to see their children succeed at school, is that provided on Prestel by TeleHomework Enterprises. It concentrates on quizzes for children, and revision for the school-leaving examinations that most British children take.

Finally, the Scottish counterpart of the CET (SCET) also an Information Provider on Prestel. (One should remember that although Britain is not a federal state, the Scottish and Northern Irish education sectors are run in an autonomous fashion.) Scotland is an interesting test area because it has the lowest population density in Britain.

5. Private videotex systems in education

An educational organisation may have one or more of the following interests in videotex:

- Research into videotex (e.g. standards, networks, user interfaces);
- Development of trial videotex systems;
- Implementation of live videotex systems for internal use;
- Teaching about videotex;
- Running a videotex bureau service;
- Evaluation of videotex services;
- Consultancy on videotex.

Given the wide range of possibilities and the amount of videotex activity in Britain, it is all the more surprising that so few educational organisations in Britain have paid attention to videotex. Among the universities, only the Open University has

carried out activities in the majority of the above areas. Only the Open University and Hatfield Polytechnic run videotex systems linked to Prestel Gateway; and only three or four educational organisations even have a private videotex system. This is surprising given the number of private videotex systems in Britain, their relatively low cost to purchase, and the relative ease with which a simple system can be implemented if suitable software cannot be purchased.

6. Videotex at the Open University : Optel

The University decided in principle to develop a private videotex system in 1978; that is, even before the public launch of Prestel. (Work on videotex terminals started even earlier, in early 1977.) Serious implementation stated in July 1979. By June 1980 the first release of the system (which we called Optel) was ready, and a first formal evaluation took place. The evaluation results were encouraging and a second release was available by May 1981. The initial database was chosen remarkably well (with hindsight); major areas were a database of course descriptions (the University runs a modular degree programme), and career guidance. It also contained information items such as University regulations which were very wordy and changed slowly: we soon realised that they were inappropriate for videotex.

Since 1981 there has been a 'permanent pilot trial' of videotex under way. The number of terminals has gradually grown to about 30, and further items were added to the database. Eventually second formal evaluation, the so-called 'Campus Presentation' took place from January to April of 1984. New features included the telephone directory and some Computer Assisted Learning.

The software performed well, the terminals (including some public access ones) were fairly reliable, and the system was reasonably popular. However, the University decided that no additional manpower could be spared in the current financial climate to keep the database up to date. Thus although the Optel videotex service continues, the database is now increasingly out of date.

7. Outcome of the Optel pilot trials

The main justification for the development of a University capability in videotex was to prepare for the day when a considerable number of Open University students have videotex terminals. (Any use of videotex in Open University offices was a bonus.) Now a mass student market has not happened nor will it happen for some years unless we take positive action to remedy the situation. With 60 000 students it is impossible for us to supply them with free videotex terminals; so the only solution is to encourage them to buy them for themselves. But such a purchase puts up the effective cost of an Open University course, and we are already worried that the cost is too high for a substantial part of the population. The situation admits of no easy solution in the short term.

It could be argued that our evaluation of Optel was premature; but we have not yet had an evaluation of viewdata for student use. The Campus Presentation had a more limited scope: to decide if there was a role for videotex in the staff offices and public places of the University. And the institutional answer has been: not without using additional manpower.

Nevertheless, some valuable institutional benefits have come as spin-offs from our videotex activities.

1. We are using videotex modems (1200/75 bits/second) for the 400 ASCII terminals we are supplying to students for a Masters level course in Software Engineering.

2. We have decided to link the main University computers together, namely the Sperry Univac 1100/81 and the Digital Equipment Corporation DEC-20, and have recently purchased Ethernet hardware to begin this process.

8. Commercial aspects

Although the Optel videotex service is no longer being used to any large extent within the University, the software system continues. A version of Optel is being run on the University's London computer on behalf of the British subsidiary of the North American company Interactive Market Systems. We have provided their users with a videotex window on their statistical software for analysing databases of market research information.

9. The ECCTIS Scheme

Similarly, in the non-business sector, the University's expertise in videotex in particular, and information technology in general, brought it to the notice of government bodies. Since 1977, the Department of Education and Science (DES) became increasingly concerned about high wastage rates in tertiary education, and after several studies of the problem, invited tenders in May 1982 for a "3-year research and development programme to design and test, on a pilot scale, a computerised Educational Counselling and Credit Transfer Information Service (ECCTIS)".

The service was required to provide summary information on all courses in the tertiary education sector, although initially coverage would be restricted to courses in universities and

institutions of comparable standing. The summary information for each course was to include:

- institution, faculty, department
- course title
- level and type of course
- outline syllabus
- normal entry qualifications
- alternative entry qualifications and exemptions
- subsequent courses, in the same or different institutions, for which the course would be an acceptable prerequisite.

The Open University was awarded the contract, and development work commenced in January 1983. The project gradually constructed a large database using the bibliographic retrieval package UNIDAS on the Sperry Univac 1100/81 belonging to the University's Management Services Division. By the end of 1983, about 20 000 records were available.

Prior to the project's start, little attention had been paid to the means of disseminating this information to potential enquirers: it had been assumed that enquirers would either telephone or write to the ECCTIS head office. It rapidly became clear that additional, more cost-effective methods would have to be found, and a study project narrowed these down to:

- printed catalogues
- microfiche catalogues
- on-line access for specialist advisory staff
- videotex for the general enquirer.

10. The ECCTIS videotex system

The University's existing videotex system (Optel) ran on a different computer (Digital Equipment Corporation DEC-20), and the two computers were run by different departments and not networked. Consequently a videotex service for ECCTIS looked idealistic, or at best very expensive. Fortunately for the ECCTIS project, Sperry announced details of their Videotex-1100 system, and delivery dates which seemed to cope with ECCTIS project timescales. In addition, the Sperry product would have the capability to link to Prestel Gateway, so that the cost of videotex network communications could be kept reasonable.

The Videotex-1100 user interface and methodology was sufficiently close to the University's existing Optel system (and to the British videotex mainstream) that overall design of an appropriate videotex window to the UNIDAS bibliographic system was not too difficult for us. Of course we had to educate the data processing staff in the mysteries of videotex, and they had to overcome the usual host of technical problems; but the end result was not in doubt, although the date that it would be achieved often was!

In the end we kept reasonably to schedule: a limited trial service was achieved through Prestel Gateway in July 1984. We hope to considerably extend its capabilities by January 1985, at which point the ECCTIS videotex service will be offered as part of a new Prestel Education product.

Further developments currently under discussion include provision of:

- details of 'non-advanced' tertiary education courses
- vacancy information for courses

- information transfer, or possibly networking, between ECCTIS and other Government information services.

We would also be interested in discussing whether any international education databases e.g. in distance education, could be handled by a similar scheme.

11. Telewriting : the Cyclops project

A radically different use of videotex technology has also been developed at the Open University. Since 1975 we have been conducting experiments in telewriting, i.e. the transmission of handwriting (and simple diagrams) between terminals over telephone lines. This project, called Cyclops, has been extensively described elsewhere, so that I will just summarise and bring the story up to date.

Towards the end of a two-year partnership with Aregon International Ltd., from 1979 to 1981, a pre-production version of Cyclops was developed and produced in limited quantities. This Cyclops multi-standard videotex terminal had the following features:

- monochrome or 8-colour versions
- Prestel capability
- alpha-geometric videotex capability
- light pen or graphic tablet for capture of handwriting
- additional text functionality (including parallel attributes and G2 plus G3 character sets).

From 1980 to 1982 British Telecom's Centre for Visual Telecommunications funded a two-year evaluation of the telewriting capabilities of Cyclops. Twenty monochrome Cyclops terminals were installed in educational institutions in the East Midlands

region of Britain, and used in conjunction with telephone conferencing to tutor groups of Open University students on a wide variety of courses. At the end of the trial, 81% of lecturers reported that Cyclops teleconferencing was a suitable way of tutoring students. Consequently we persuaded British Telecom to continue some support for the project and extended the trial for a third year, throughout 1983.

Unfortunately at the end of 1983 the financial crisis affecting the Open University was severe enough that a number even of promising activities had to be curtailed, and so the Cyclops service was shut down in the Open University at the end of 1983.

12. The Excom 100

However it could be argued that the Open University is not at all typical of British educational institutions, since it relies heavily on high-volume publishing and educational television to achieve its educational ends: thus live human teaching (whether face to face with students or via telephones or Cyclops) is a marginal and add-on activity. The large interest in Cyclops shown by other parts of the British educational community suggested that in mainstream educational organisations (where face to face teaching is dominant), Cyclops could have a role to play in reaching dispersed groups of students. And of course the use of telewriting is not confined to education, but has applications in for example industrial training and business-to-business communication.

In Summer 1983 Aregon launched a revised and more powerful version of Cyclops which they christened the Excom 100. In addition to its telewriting and multi-standard videotex modes, this also

offers a standard 24 by 80 ASCII terminal option, thus positioning it firmly in the 'added-value' business terminal market.

Systems including Excom 100 terminals have been supplied for business use in several organisations, for example the Civil Aviation Authority and the British Gas Corporation. The Excom 100 terminals were also used to provide communications facilities at the recent World Economic summit in London.

13. PACNET

Excom 100 terminals have also been supplied to the educational market. In Summer 1984 a new audio teleconferencing service (PACNET) started at Plymouth Polytechnic, with substantial funding from British Telecom and the Manpower Services Commission. The PACNET scheme is designed to evaluate the use of teleconferencing in the 'conventional' polytechnic sector. A number of Excom 100 terminals have been supplied to PACNET, and in addition to their use in the tertiary education sector, one of the local colleges (East Devon College) has plans to try out Cyclops teleconferencing as a way to assist the teaching of specialist subjects in remote secondary schools.

14. The Indonesian pilot trial

But the Excom 100 is also being used in a situation where mere British definitions of 'remote' are inadequate. In Summer 1983, the Academy for Educational Development (AED) based in the United States, recommended the use of Excom 100 terminals, communicating via the Palapa satellite, to link together 12 university campuses in Indonesia. Implementation of this system started shortly afterwards, and it has recently become fully operational.

One of the main advantages of telewriting systems such as the Excom 100 is that they require only modest communications bandwidth, compared with other methods of visual communication. In particular, the Excom 100 normally operates with a 1200 bits/second data channel, whereas a slow-scan system of equivalent functionality might require 56 kilobits/second, and a full-motion video system 2 megabits/second. The cost of Excom 100 is also substantially less than the codecs required for slow-scan or full-motion video. Last but not least, telewriting traffic can easily be multiplexed, for example on an X25 network.

There are even some modems available which will multiplex a low-speed data channel with speech into the speech band of a normal telephone channel. However, these normally only support about 300 bits/second. I believe that such a modem could be produced with 1200 bits/second performance, but it is not clear whether such a modem would ever be cheap enough soon enough; one should remember that alternative 'speech over data' systems are being developed for the Integrated Services Digital Network which is soon to begin pilot trials in a number of countries.

15. What other educational applications of videotex are there?

I have now described the major activities in educational videotex in Britain. But could there be more possibilities? To answer this question we have tried to produce a forecast of what further applications of videotex in education will take place in the next few years as terminals become more widespread. The forecast is based on the following taxonomy of stages in the educational process (shown on the next page)..

It should be clear from my description of ECCTIS that it is possible to provide a reasonable videotex interface to a bibliographic database system. There is also plenty of evidence

to show that videotex can provide quite powerful electronic mail systems.

Stage	Description	Videotex techniques
1	Formulation of course syllabus	Electronic mail
2	Creation of material	- - -
3	Dissemination of material	Limited use, for updates of material
4	Tutoring of material	Electronic mail, telewriting
5	Assessment of material	'Order entry'
6	Counselling of student (personal, educational, financial, career)	Electronic mail, databases
7	Administration (registration, fees, progress	Electronic mail, 'order entry'

The reason that I have put 'order entry' in quotation marks is that order entry systems are the nearest business equivalent to the kind of system that I have in mind for educational use, for example for registering for a new course or taking a multiple-choice examination.

16. Computer Assisted Learning

Many people might wonder why there is no mention of Computer Assisted Learning (CAL) in the above table. This is because we believe that CAL will take place predominantly on microcomputers, with the videotex system used to check performance from time to time, either with the student on-line or by uploading assessment scores. There has been no serious use of videotex in CAL in the British education sector.

Of course it is technically possible to provide CAL via videotex terminals. Indeed, we have carried out a design exercise where we added a relatively small amount of functionality to a videotex system to give it simple CAL capability but still look like a videotex system. The functionality required is essentially the ability to store and update 'internal variables' in the videotex system.

However, except in those situations where telecommunications costs are free or minimal, it makes better economic sense in Britain to use a microcomputer for CAL. The only substantial use of videotex in a field related to education is the use of a private videotex system in Barclays Bank for staff training; and there has been little sign of other organisations following that approach.

The microcomputer CAL system may well have a strong videotex flavour. For example Microtext, a recent CAL product on the Acorn BBC Microcomputer, uses exclusively the viewdata mode (mode 7) of the BBC Micro display screen. There are signs that 'traditional' CAL system companies may also follow this route.

17. Telesoftware systems

I want to conclude with two notes of caution about telesoftware. This may seem surprising, since Britain has been a pioneer in the use of telesoftware, both in education and for the residential market. But there are two points worth making about telesoftware:

1 Do not use telesoftware merely to compensate for the inadequacies of your public videotex system. Get the public system right: in particular, make sure that it links efficiently and cheaply to private videotex systems.

2 Do not assume that all software distribution problems can be solved by telesoftware.

Both points are relevant to education. Regarding (1), installation of a private videotex system and connecting it to Prestel has until recently been a fairly difficult and expensive process. In fact, for the first two years of Prestel it was not possible. There was a temptation to use telesoftware as a way of getting incremental, cheap, easy gains in functionality even if the overall system design was going in a poor direction.

Regarding (2), one problem about 'real' CAL programs (i.e. those produced by professionals for a serious training purpose) is that they can be big. And at 1200 bits/second, allowing for protocol overheads, a reasonable program of 30 Kbytes would take upwards of 5 minutes to load. (And it will be several years before higher videotex speeds are widespread.) There are also several problems concerning software protection and charging to be solved. Such problems are inhibiting, or at least delaying, the launch of 'Business Micronet', the proposed telesoftware service for business microcomputers in Britain.

18. The next step in Britain

The next step in educational videotex is likely to come from some new organisation, or new grouping of organisations, or small organisation wanting to grow, rather than from the existing larger educational providers. It is likely to focus on vocational education, possibly part-funded by the Manpower Services Commission under the so-called 'Open Tech' scheme.

The time is fast approaching when a new organisation can consider offering courses only to a population of students all of whom have (or will buy) microcomputer videotex terminals. Given such a population, much of the educational process apart from bulk delivery of material can be handled by videotex. Bulk delivery of material still requires printing and publishing, but a new small organisation should be able to avoid the traditionalist approach to printing still dominant in Britain today, and by deploying word processors and laser printers should be able to radically cut the cost even of this part of its operation.

Such a 'new wave' educational organisation will begin to transform the educational sceme, rather lke the way the Open University did in 1970 with distance education, and the British Broadcasting Corporation in 1980, with the BBC Micro. But who will it be this time?

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